THE WESTERN AUSTRALIAN
NATURALIST

Vol. 25 30th March 2006 No. 2

PROBABLE LOCAL EXTINCTION OF THE BUSH RAT, *RATTUS FUSCIPES* ON EAST WALLABI ISLAND IN THE HOUTMAN ABROLHOS

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ABSTRACT

The Bush Rat, *Rattus fuscipes*, has not been trapped on East Wallabi Island in the Houtman Abrolhos, Western Australia, since 1967. Recent surveys on both East and West Wallabi have suggested that though there is a significant population of Bush Rats present on the latter, there is a possibility that the population on East Wallabi is either very small or extinct. Further survey work to establish the status of Bush Rats on East Wallabi is necessary.

Figure 1. Photo of *R. fuscipes*. (Photo Greg Barron).

This paper is dedicated to the memory of Greg Barron (1952-2005), who was a noted naturalist, photographer and Western Australian Museum staff member from 1977 to 1985.

INTRODUCTION

The common and widespread Bush Rat, *Rattus fuscipes*, is a medium sized native Australian rodent (Figurel) with weights ranging between 40–225 g throughout its distribution around the coast of southern and eastern Australia and on near-coastal islands. There are four currently recognised subspecies (Lunney 1998). In Western Australia, it is present in coastal forests and shrublands from Jurien Bay southeast to Point Dempster with outlying populations on the Wallabi Islands of the Houtman Abrolhos (Figure 2).

Rattus fuscipes was first collected during the Voyage of the Beagle [1832–1836] and described by Waterhouse in 1839. The holotype (the specimen designated as the type specimen of the nominal species) was collected at King George's Sound, Western Australia in March 1836 and has since been lost. A neotype (a newly designated type specimen selected in the absence of the holotype) was designated by Taylor and Horner in 1967 (Western Australian Museum specimen M6634) as a female collected at "Princess Royal Harbour, approximately 4 miles due south of Mount Melville

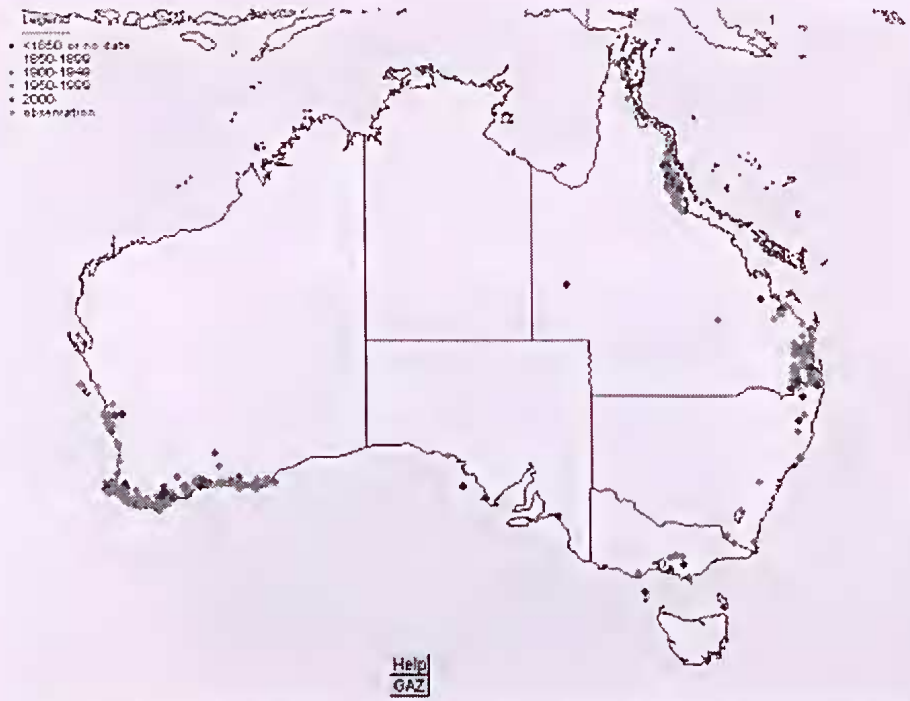

Figure 2. Map of distribution of *R. fuscipes* across Australia from www.museum.wa.gov.au/faunabase

Albany, WA". This locality is approximately four miles from where H.M.S. "Beagle" is thought to have anchored in 1836.

In 1926 Thomas named a specimen from East Wallabi Island (British Museum, BMNH 26.7.12.2 original Western Australian Museum registration number 9103) as *Rattus glauerti* because the teeth were "so conspicuously smaller than those of the mainland animal as to indicate specific distinctness". The name *R. glauerti* was subsequently synonymised with *R. fuscipes.*

Given the remoteness and isolation of this population of *R. fuscipes* from mainland ones and the fact that isolated reptile species on the Abrolhos islands are taxonomically distinct, (the Abrolhos Dwarf Bearded Dragon, *Pogona minor minima* and Abrolhos Spiny-tailed Skink, *Egernia stokesii stokesii*), there is a need to determine the taxonomic status of *R. fuscipes* on the islands.

The Houtman Abrolhos is an archipelago of over 170 islands, islets and rocks (Harvey *et al.* 2001) lying some 55–70 km off the mid west coast of Australia and it is the site of the earliest European habitation of the continent in 1629. The Archipelago comprises four island groups, the southern Pelsaert Group, the central Easter Group, the northern Wallabi Group and even further to the north, North Island. All these groups are separated from one another by sea depths of over 40 m and by similar depths from the adjacent mainland.

West and East Wallabi Islands (Figure 3a and 3b), are the largest islands in the archipelago and consist of Cretaceous and Tertiary limestone, siltstone and marl of continental origin, and have been isolated by rising sea levels for between 6000–8000 years from the adjacent mainland (Harvey *et al.* 2001). They are currently separated from each other by nearly 2 km of ocean at a depth of less than 2 m. Important geological features on East and West Wallabi include pavement limestone, sand dunes and consolidated dunes which are unusual, easily disturbed structures that have a slow rate of regeneration (AIMAC & Fisheries WA 1998.)

East Wallabi has an area of 307 ha while West Wallabi is 587 ha. Both have an average annual rainfall of 400mm (Abbott &Burbidge 1995). The flora, vegetation structure and geological associations of the islands are described in Harvey *et al.* (2001; Table 11), who report that 97 species occur on West Wallabi and 74 on East Wallabi of which 79% and 64% are native, respectively. Storr *et al.* (1986) have described the birds of the Abrolhos. There are 27 species of bird recorded from East Wallabi, 24 landbirds and 3 seabirds; on West Wallabi there are 48 species, 35 species (including waders) and 13 seabirds (*pers. comm.* Ron

Johnstone). Nineteen species of reptiles, (How *et al.*, 2004) have been recorded from West Wallabi and 16 species from East Wallabi. A further two taxa have been added to the East Wallabi reptile assemblage as a result of the November 2005 survey (Maryan 2005).

According to Abbott and Burbidge (1995) neither island was accessible to Aborigines prior to European settlement. However, this does not indicate that

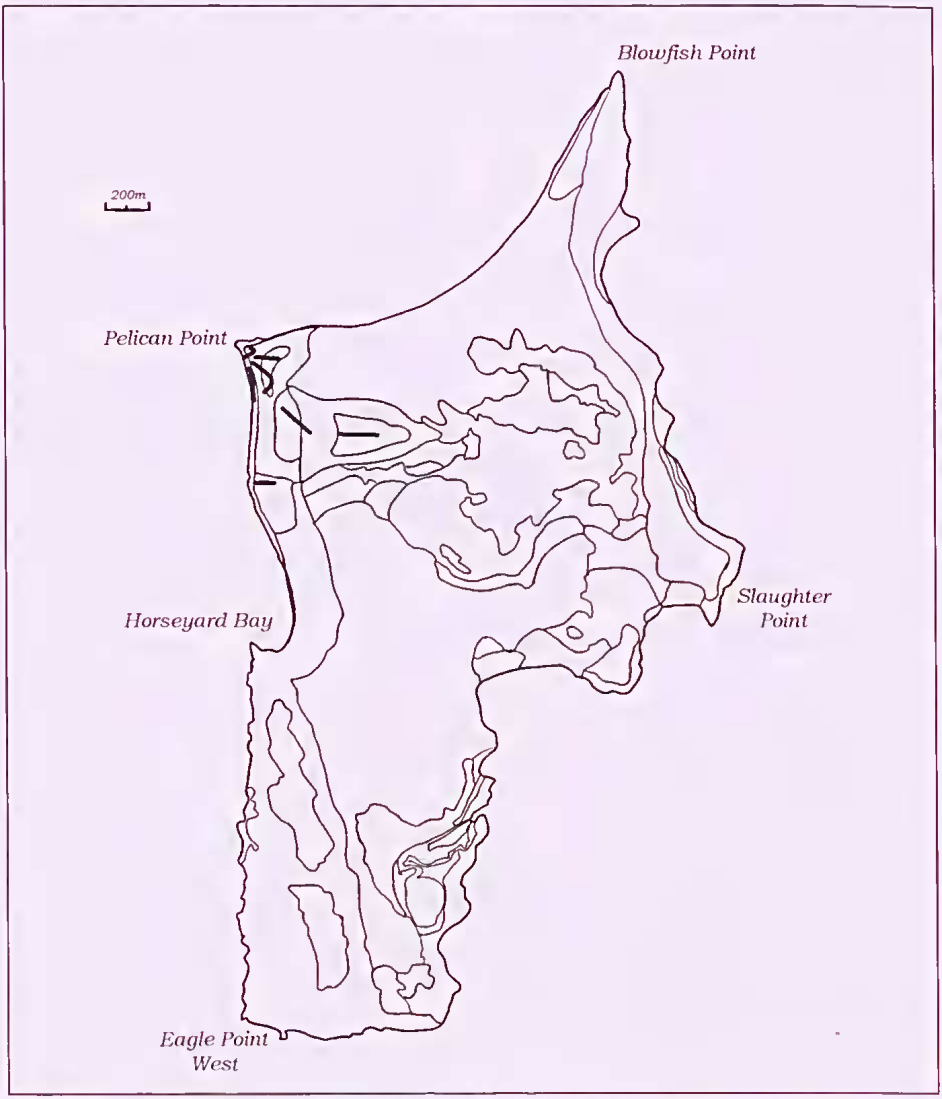

Figure 3a. Map of West Wallabi Island with trap lines marked in bold. Contour lines representing habitat types (after Harvey *et al.* 2001).

Aboriginal people did not access the land when it was connected to the mainland (M. Smith *pers. comm.*). West Wallabi is historically famous for the landing of the soldiers shipwrecked from the Batavia, in June 1629 looking for water, and their subsequent stranding and attacks by J. Cornelisz, the mutineer. Presently, East Wallabi is uninhabited but has an airstrip that gives access to tourists and visitors travelling to other islands. Rock lobster fishers have a settlement at Pelican Point, West Wallabi which they seasonally occupy. Both islands are under the control of the W.A. Department of Fisheries.

The history of trapping of *R. fuscipes* on the islands strongly suggests that the population on East Wallabi is either very low or now extinct, with the last known record being from 1967. In November 2005, a field survey of West and East Wallabi Islands in the Houtman Abrolhos was organised between the Western Australian Museum and the Department of Conservation and Land Management to document the reptile fauna and evaluate the populations of *R. fuscipes* on the Wallabi Islands.

MATERIALS AND METHODS

Information on the presence of *R. fuscipes* on East and West Wallabi Islands was extracted from the mammal database of the Western Australian Museum, Western Australian Museum catalogues and the field notebooks of Glen Storr, Alex Baynes and Ric How.

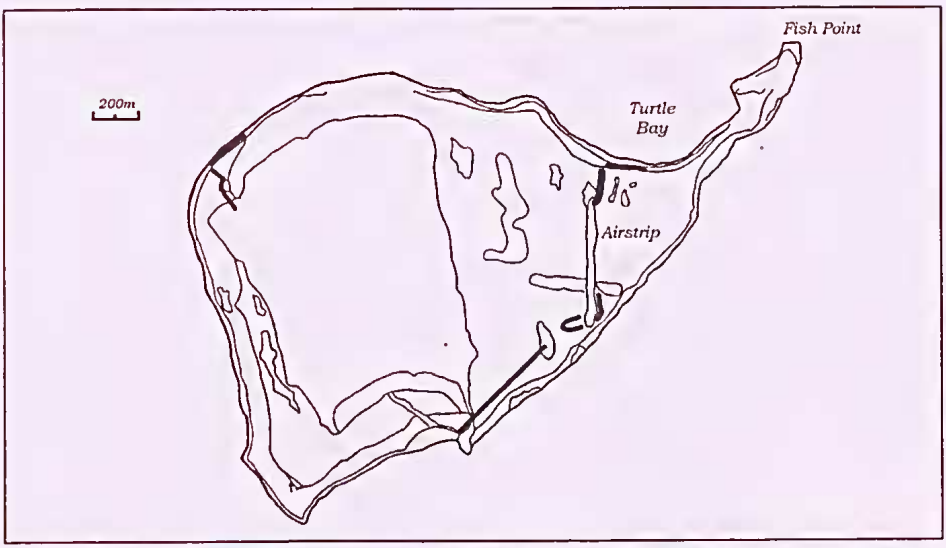

Figure 3b. Map of East Wallabi Island with trap lines marked in bold. Contour lines representing habitat types (after Harvey *et al.* 2001).

Many individuals who have worked on the Wallabi Islands or who have visited them were contacted for any information regarding evidence of *R. fuscipes* sighted or trapped in the last three decades on the islands.

Collections of *R. fuscipes* from the islands were made either by hand or using mammal traps of various types. Early trapping involved the use of Break-back traps (like large mousetraps), however, these have not been used since the 1980s for ethical reasons. Baynes used Sherman traps (large collapsible metal box traps) while recent trapping has involved the use of Elliott traps (collapsible aluminium box traps) and pit-fall traps with fence lines.

The notebooks confirm that trapping generally occurred in several vegetation types and at numerous locations on the two Wallabi islands (Figure 3a and 3b). It was not possible to differentiate trapping effort into the various habitat types identified by Harvey *et al.* (2001), although trapping by Baynes and How is known to cover several habitat types on both islands.

During the November 2005 survey all individuals trapped were examined to determine their sex; measured for nose-vent length, tail–vent length and weighed.

RESULTS

TRAPPING HISTORY

The specimen named *R. glauerti* by Thomas in 1926, was collected from East Wallabi Island on 17 November 1907, (original Western Australian Museum registration number is 9103). The specimen was received in exchange by the British Museum from the Western Australian Museum. In 1926, Thomas donated New Guinea and Queensland specimens to the Western Australian Museum and these may have been the exchange specimens for the *Rattus* type.

From data in the notebooks and the mammal database of the Western Australian Museum, *R. fuscipes* was observed and collected on East Wallabi Islands in April 1959 by G. Storr, who also collected two individuals in September of that year using Break-back traps. In December 1966, J. Kirsch collected specimens from East Wallabi and in August 1967 A. Baynes and M. Archer trapped the last known individuals from East Wallabi (Table 1). In September 1977, R. How trapped in the same location as Baynes, from the southeastern beach through to the eucalypt patch, and failed to record the species (Figure 3b). In October 2002 Pearson and How again failed to trap individuals on East Wallabi Island while trapping on the southwestern dunes and limestone pavement.

Individual *R. fuscipes* were collected on West Wallabi Island in April 1959 by G. Storr who was again successful in June and September 1959. Individuals were

Table 1. Summary Table of trapping data for *R. fuscipes* on East and West Wallabi Islands, including Date, Trap type (E, Elliott; BB, Break Back; P, Pit fall), number of individuals trapped and the collectors names. An asterisk denotes observations only.

West Wallabi			East Wallabi			Collector
Date	Traps	Individuals	Date	Traps	Individuals	
20/04/1959		3	20-21/04/1959	observed	2*	Storr
22/06/1959		3+5*				Storr
26/06/1959		2				Storr
12/09/1959		2	08/09/1959	BB	2	Storr
22/04/1960		4				Kelsall
23/04/1960	by hand	1				Storr
			00/12/1966		2	Kirsch
			06/12/1966		2	Kirsch
			27-31/08/1967	205S	9	Baynes & Archer
28-29/08/1977	50E + 38BB	4	2/09/1977	25E + 12BB	0	How
12-14/10/1999	75E	2				Pearson & How
29-30/10/2002	100E	3	31/10/2002	48E	0	Pearson & How
8-11/11/2005	160E	22	7-10/11/2005	199E	0	Cooper & How
8-11/11/2005	140P	21	7-10/11/2005	92P	0	Cooper & How

trapped or caught by hand in April 1960 by J. Kelsall and G. Storr, while in August 1977, R. How successfully trapped individuals on West Wallabi (Table 1). The species was again trapped on West Wallabi by D. Pearson and R. How in October 1999 and October 2002.

No further records or sightings of *R. fuscipes* on the islands were obtained by the authors.

NOVEMBER 2005 SURVEY

During the November 2005 survey no *R. fuscipes* were caught on East Wallabi, although 291 trap nights using both Elliott and pit fall traps were employed. During the same survey period 43 *R. fuscipes* were caught on West Wallabi Island after 300 trap nights using both trap types, with no difference in capture rates between either trap type (Table 1). Active Bush Rats were also observed during the cool overcast days during this survey.

Four of the 43 individuals were recaptures while one escaped and two were killed by shearwaters in pitfall traps. The weight and measurements of the individuals are presented in Table 2. Adults and sub-adults were represented in the samples of both sexes.

DISCUSSION

The last *R. fuscipes* caught on East Wallabi Island was in August 1967 and, despite additional surveys in September 1977, October 2002 and November 2005, no captures have subsequently been made. The direct temporal comparison during this study of trapping success for *R. fuscipes* on both East and West Wallabi Island clearly indicates that while a healthy population persists on West Wallabi Island, no individuals were found on East Wallabi Island. During extensive diurnal searches for reptiles on each of the Wallabi Islands during the November survey, *R. fuscipes* was seen on West Wallabi but no observations or signs were recorded on East Wallabi. This absence of sightings and differences in the trapping success on East Wallabi Island contrasts with the success of captures for the species on West Wallabi over the same time span and suggests that there is a strong possibility that the *R. fuscipes* population on East Wallabi is extinct.

Eastern populations of *R. fuscipes* are known to be larger in summer and autumn when young are weaned and the

Table 2. Summary of Mean, Standard Deviation, Minimum and Maximum measurements for Nose-vent Length, Tail-vent length and Weight for 18 female and 13 male *R. fuscipes* trapped on West Wallabi Island in November 2005.

	Nose-Vent Length (mm)	Tail-Vent Length (mm)	WEIGHT (g)
Females (18)	114.4±18.5, 75–145	100.2±14.3, 70–123	53.4±15.1, 23–75
Males (13)	114.5±15.7, 95–150	100.2±13.5, 80–120	52.9±17.8, 29–96

population numbers are lowest in winter. In the present spring study, November 2005, small sub-adults (animals which are not reproductively mature), were present in the West Wallabi population. However, the presence of sub-adults, does not explain the far higher trapping success of *R. fuscipes* on West Wallabi for this survey than in any previous one on the island undertaken during the winter and spring.

Island populations have exhibited much higher densities than on the adjacent mainland for Glennie Island in Bass Strait (Hobbs 1971; Robinson 1975), and comparatively high densities of Bush Rats have been recorded by Wheeler (1970) on Kangaroo Island and Schmitt (1975) on Pearson Island off South Australia.

Bush rats are omnivorous, eating seeds, fruits, grasses and insects (Watts and Aslin 1981) and are opportunistic in their diet. They were also observed during the present study eating small reptiles (geckos) caught in the same pit trap.

In 1976, Baverstock found that the water requirements of Bush Rats in captivity were the highest of any native rat yet studied. Despite this, it lives in the driest habitats of any native true rat except the Longhaired Rat (*R. villosissimus*) and Tunney's Rat (*R. tunneyi*), suggesting that physiological adaptations that allow survival without water are not necessary for successful exploitation of an arid environment. Behavioural adaptations and adoption of a specialised diet may be equally important (Watts and Aslin 1981).

Several factors probably influence the population size of *R. fuscipes* on the two islands. East Wallabi is about half the size of West Wallabi, has fewer plant species and is less diverse in landform and vegetation types (Harvey *et al.* 2001). It is apparent from our survey that populations of the Carpet Python (*Morelia spilota*) and Tammar Wallaby (*Macropus eugenii*) are markedly less abundant on East Wallabi and the size of adult skink lizards *Ctenotus fallens* are smaller on East Wallabi than West and this probably reflects lower productivity on the former.

There are an estimated 1 030 000 pairs of Wedge-tailed Shearwater, *Puffinus pacificus* and the Little Shearwater, *Puffinus assimilis assimilis* breeding on West Wallabi (Fuller *et al.* 1994), the burrows providing shelter and the eggs a possible food source for *R. fuscipes*. There are very few nests of either species of shearwater on East Wallabi (C. Surman *pers. comm.*).

Fisheries WA (2001 p36) suggested that a detailed assessment should be made of the potential for East Wallabi Island for tourism development, however, until there are further seasonal studies to assess the population status of *R. fuscipes* and to determine the activity

patterns and structure of the reptile assemblage on the island this should not be considered.

With *Rattus glauerti* having been synonymised with *R. fuscipes*, material collected from the Wallabi islands is being analysed by Steve Donnellan of the Evolutionary Biology Unit, South Australian Museum to determine the genetic relationships of *Rattus* on the Wallabi islands and to clarify their taxonomic status.

ACKNOWLEDGEMENTS

This project was funded by a grant from the Western Australian Museum Foundation with logistic support from the Department of Conservation and Land Management (CALM).

We are grateful to Ross Ayling, and his crew, Ross and Bill on the *Wave Dancer*, for their support and hospitality on West Wallabi Island and transport to and from the Abrolhos Islands. David Pearson, Zoe Hamilton, Brad Maryan and Jason How provided invaluable support during trapping programs on the Wallabi Islands.

The October 1999 and 2002 surveys were funded by CALM funds to David Pearson. Alex Baynes provide helpful advice and access to his early notebooks and Ron Johnstone assisted in locating information from his notebooks and from those of Glen Storr.

We also thank Mr Russell Dyson, Regional Manager, and Andy Darbyshire of the Fisheries Department, Geraldton, for permission to undertake the survey on the Wallabi Islands. The Western Australian Museum currently works under a CALM Permit No SF004816 to collect fauna and has ethics approval through the CALM Animal Ethics Committee [*License to Use Animals for Scientific Purposes No.* U18/2005] to take tissue from individuals.

We also thank Claire Stevenson who produced Figures 3a and 3b.

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